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MODEL MA-4000F

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* SPECIFICATIONS

Type	Solid state pre., main amplifier	Loudness control	100Hz +8dB 10KHz +4dB (volume control at −30dB)
Circuit system	Semicomplimentary SEPP circuit		
Semiconductors	37 transistors, 12 diodes		
Music power	80W	Hum and noise	Less than 0.5mV
Continuous power	10W x 4 (at 1% distortion)	Signal-to-noise ratio	PHONO ... 60dB
Power bandwidth	30Hz ~ 35KHz (at rated output)		TUNER ... 70dB
Total harmonic distortion	0.5% (at 1W output)		TAPE 1 ... 70dB
Frequency response	AUX, TUNER, TAPE 1, TAPE 2 30Hz ~ 35KHz (+0, −3dB)		TAPE 2 ... 70dB
			AUX..... 70dB
	PHONO ... RIAA characteristic		MIC 55dB
	MIC ..... 50Hz ~ 10KHz		CD-4 MATRIX ... same as AUX
Tone control	BASS 100Hz ± 10dB	LINE OUT output	200mV
	TREBLE 10KHz ± 10dB	DIN connector output	30mV (80KΩ)

Printed in Japan 298-1770-00

MA-4000F

Input sensitivity and impedance	PHONO ...	3mV (50 KΩ)
	TUNER ...	200mV (150KΩ)
	TAPE 1 ...	200mV (150KΩ)
	TAPE 2 ...	200mV (150KΩ)
	AUX.....	200mV (150KΩ)
	MIC	3mV (10KΩ)
	CD-4 MATRIX ...	same as AUX
Maximum permissible input	PHONO ...	50mV (1KHz), preamp. section
	TUNER ...	1.5V (1KHz)
	TAPE 1 ...	1.5V (1KHz)
	TAPE 2 ...	1.5V (1KHz)
	AUX.....	1.5V (1KHz)
	MIC	30mV (1KHz)
	CD-4 MATRIX ...	same as AUX
Damping factor	Larger than 30 (8Ω)	
Power requirements	AC 220V、50Hz	
Rated power consumption	40W	
Dimensions	150 (L) x 156 (H) x 272 (D) mm	
Weight	Approx. 5Kg	
Load impedance	8Ω	

* COMPONENT

	Main unit	1 Set
280-3323-00	Owner's guide	1 Each

* FEATURES

1. Genuine 4CH discrete pre., main amplifier

- ○ An ITL-OTL circuit using all silicon transistors is employed.
- ○ Besides being small type, provides a total music power of 80W due to use of high-power transistors.
- ○ Tone control circuit employs separate BASS (low frequencies) and TREBLE (high frequencies) controls so that desired tonal quality can be enjoyed.
- ○ Since a loudness control is provided, dynamic sound can be enjoyed even at low listening levels.
- ○ A microphone mixer is provided for mixing the microphone input with other inputs.
- ○ 4CH stereo headphones can be used.
- ○ An automatic protector circuit is provided for protecting the power transistors in the event of too large external noise or signal, or speaker short.

2. Multifunction use is possible

- ○ Terminals for using as CD-4, matrix, tape discrete are provided.
- ○ A mode switch for using the FRONT and FRONT, REAR speakers separately is built-in.
- ○ Terminals for connecting a color sound graph (option) are provided.
- ○ DIN and PIN terminals can be separately used by switching TAPE 1, TAPE 2.
- ○ Terminals for connecting disc player, tuner, auxiliary input, etc. are provided.
- ○ Two AC connectors (switches and unswitched) are provided as AC outlet.

* MA-4000F MAINFRAME OPERATION

SELECT switch

SELECT is set according to the input without regard to 2CH or 4CH.

AUX ..... when AUX terminals are used
TAPE 1..... when DIN terminals are used
TAPE 2..... when TAPE 2 terminals are used
TUNER..... when TUNER terminals are used
PHONO..... when PHONO terminals are used

Operation of MODE switch

- ○ When using 2 channels, set the MODE switch to 2CH position. 2CH position has FRONT and F + R (FRONT + REAR), but when set to FRONT, the rear speaker is cut off.
  On F + R, the front and rear speakers operate in parallel on both left and right channels.
- ○ When using 4 channels, set the MODE switch to 4CH position. 4CH position has TAPE, CD-4, and MATRIX. For tape (discrete), set to TAPE, and for CD-4 and matrix, set to CD-4 and MATRIX.
- ○ Operation of channel balance controls
  Set the MASTER VOLUME control to a suitable position. Then adjust the volume of each speaker by means of the channel balance controls.
  These controls are designed to be normally set in the middle, but adjust them freely according to unbalance caused due to speaker's position or according to requirement at the place of listening.

4CH OPERATION WITH PLAYER

- **CD-4 operation**

  For CD-4 operation, 4CH use player and demodulator (available in the market) are necessary. In that case, use a 4CH stylus (available separately). Connections are the as in the case of player A of the Overall Connection Diagram.

- **Operation of matrix**

  A decoder (available in the market) is required to operate the matrix.
  At this time, it is possible to use 2CH stylus (MPS-201) in the player. Connections are made as follows. Connect the output from the player B to the PHONO terminals of this amplifier (MA-4000F). Connect from the LINE OUT terminal of this amplifier to the decoder input, and connect the output of decoder to the MATRIX terminal of this amplifier.

4CH (MATRIX) OPERATION ON FM BROADCAST

- **A decoder is necessary, the same as in the player matrix operation described above.**

  Connect the output from the tuner to the TUNER terminals of the amplifier (MA-4000F). Connection to the decoder is the same as before.

CONNECTION OF 4/2 CHANNEL 8 TRACK TAPE DECK MD-4000F

- Connect by means of the accessory cords (852-4828-00) from the output terminals (FRONT, REAR) at the rear panel of tape deck to the TAPE 2 terminal (FRONT, REAR).
  Moreover, it is also possible to connect using 2 DIN cords (available separately). At this time, avoid using pin jack connection and DIN connection.

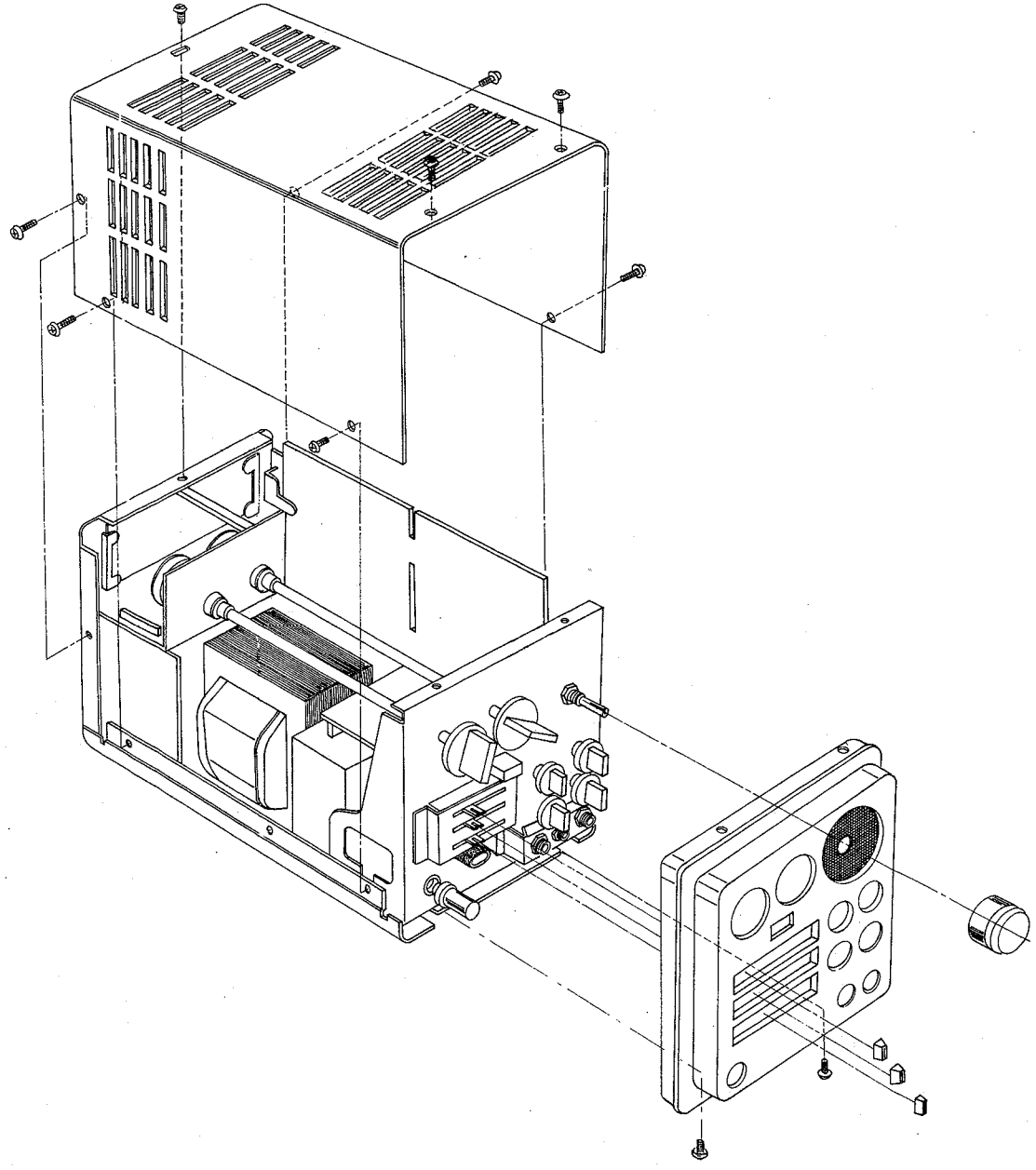
CASSETTE TAPE DECK MD-8000F

- Recording and playback becomes possible when the LINE OUT (output terminals) and LINE IN (input terminals) at the rear panel of cassette tape deck are connected to the AUX (external input terminal) and LINE OUT (output terminal) of the amplifier (MA-4000F) using connecting cords (852-4828-00). If the MODE switch is set to F + R, reproduction is made through 4 speakers.
  Moreover, recording and playback also becomes possible by connecting with DIN cord (available separately). (However, only for the FRONT terminals). At this time also, avoid using pin jack connection and DIN connection.
- There are two places, FRONT and REAR, for connecting the DIN cord to the amplifier (MA-4000F), but the REAR terminals are only the playback input terminals. This amplifier (MA-4000F) possesses 4CH reproduction function but the recording function is only for the FRONT section.
  NOTE) Mix. mixing is possible only for FRONT (R. L).

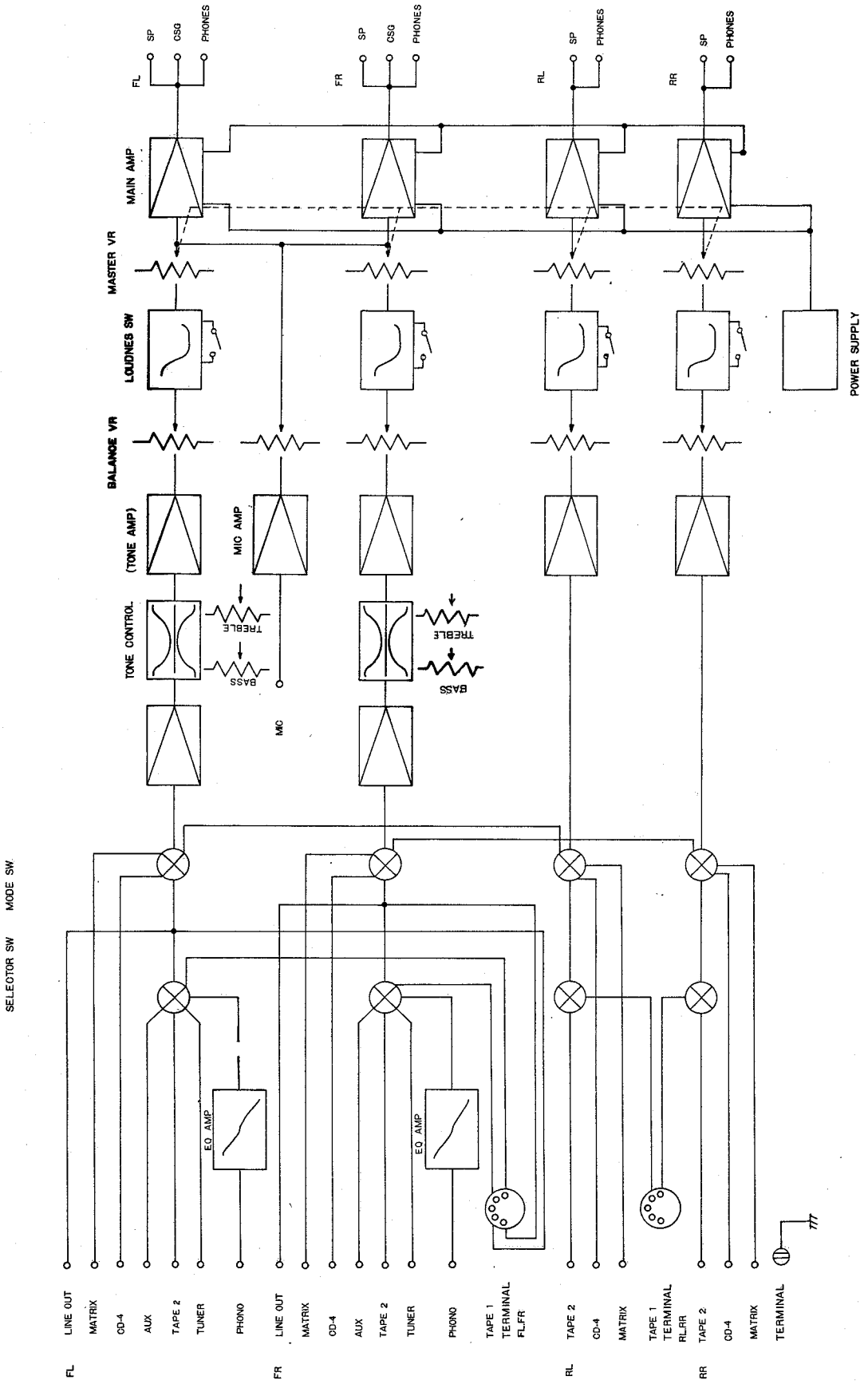
WHEN THE SET IS NOT FUALTY

Case		Condition	Cause	Corrective action
When a broadcast is received		When a stereo broadcast is received, the stereo indicator lamp does not light and stereo effect is absent. Stereo indicator lamp blinks.	a. Signal is weak. b. Fading (fluctuation of signal strength) is large. (disturbance of signal)	Try listening as FM mono by setting the input selector switch to [FM MONO]. If an indoor antenna is being used, change to outdoor antenna. If an outdoor antenna is being used, try changing the installation place, direction of the antenna.
	F	Hum noise is produced	Connecting cord contact faulty.	Check the connection.
	M	Noise appears when a car passes.	a. Antenna installation place is not proper, or signal is weak. b. The station is not properly tuned in.	a. Select a place for installing the antenna so that the road does not appear in the direction to which the antenna is directed, or the antenna becomes away from the road. b. Tune to the station properly.
		Electric shock is felt when the amplifier case is touched on a rainy day. (Same thing happens in the case of AM reception as well)	Outdoor antenna has electrostatie charge.	Securely ground (GROUND terminal) to an earth ground.
		Hissing noise. (The noise is large in the day or when signal is weak).	Noise produced by electrical apparatus like fluorescent lamp etc.	Keep the tuner MT-9000F or the outdoor antenna away from electrical apparatus. Or find a direction, position in which noise is minimum. Install the AM use antenna high in the air (more than 5m high).
	A	Strong whistle noise.	a. Noise coming from TV. b. Beat whistle due to interference of adjacent station. (Specially large during night).	a. Switch off the TV. (Noise may also be caused by the TV of neighbouring houses). b. Reduce high frequencies by turning the TREBLE knob.
	M	Chattering sound is produced sometimes.	a. Due to lightening. b. Due to fluorescent lamps ON/OFF.	b. Keep the antenna away from fluores cent lamp or find a better direction.
		When a station is tuned, tuning hum is produced.	Antenna is near power cord.	Keep the antenna away from power cord. Try reversing the plug of power cord.
		Does not stop when automatic tuning is used.	a. Antenna connection is imperfect. (FM) b. Ferrite bar antenna is not tilted.	a. Connect the antenna securely. b. Tilt the ferrite bar antenna. If the noise still does not stop, set the SENSITIVITY switch to DX.
When a disc record is being played.		Humming noise is produced.	a. The connecting cord is not shielded. b. Ground side connection of the connecting cord is imperfect.	a. Use a genuine shielded cord. b. Check pin jack connection.
		Oscillation sound (booming or whistling) is produced. (Also appears when a microphone is used).	The record player is put directly on the top of speaker or near the speaker.	a. Place a cushion under the player. b. Try changing relative positions of speaker and the player. c. In the case of microphone, keep the microphone away from speaker.
		Sound is rough (distorted).	a. There is dirt (dust) on the record or the stylus. b. Stylus is dull (worn). c. Stylus pressure is not correct.	a. Clean b. Replace the stylus. c. Adjust the stylus.
When a tape is being played back.		No sound, or sound is not stable.	Head is dirty	Clean the head with head cleaner.
		Hissing sound is produced.	Tape deck's head is magnetised.	Demagnetise using a head eraser.

* MAIN DISSECTION VIEW



* BLOCK DIAGRAM

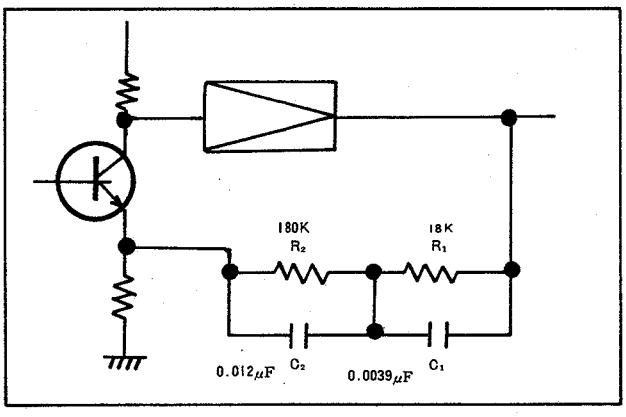


* CIRCUIT DESCRIPTION

1. EQUALIZER AMPLIFIER

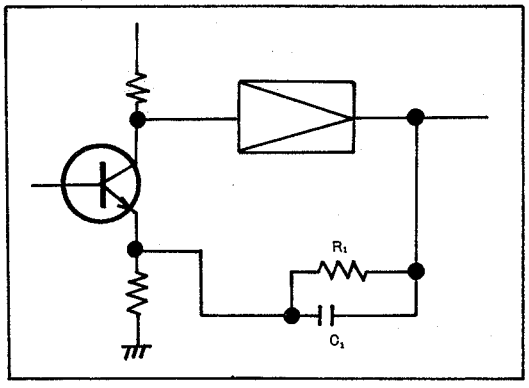
Output of a magnetic cartridge increases as the frequency increases. Equalizer amplifier is used to compensate this difference using a circuit having a frequency characteristic opposite to that of a magnetic cartridge to make the frequency characteristic flat.

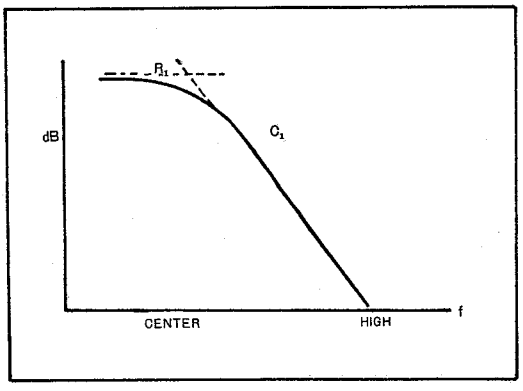
The characteristic of the equalizer amplifier conforms to RIAA (U.S.A. recording association).



A) Midrange, high frequencies

Since the impedance of C2 becomes low and it can be considered as a short circuit, the equivalent circuit becomes as shown in the below Fig.

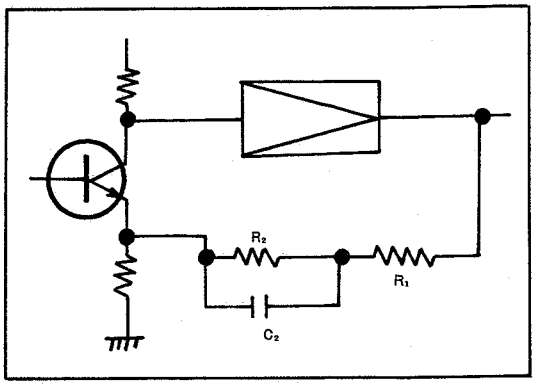


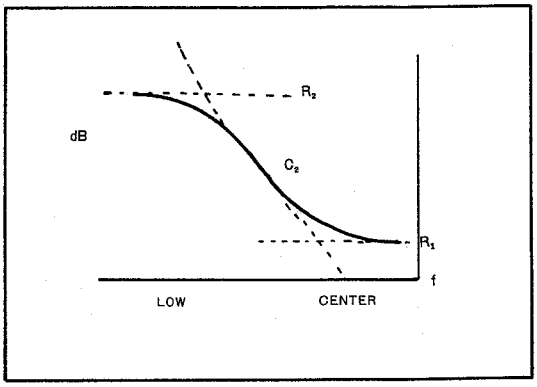


In the midrange, the impedance of C1 increases, feedback to the emitter decreases, and consequently, the amplification increases. But as the frequency increases, impedance of C1 decreases, the feedback increases, and the amplification decreases.

B) Low frequencies

Since the impedance of C1 becomes large at low frequencies and it can be considered as an open circuit, the equivalent circuit becomes as shown in the below Fig.

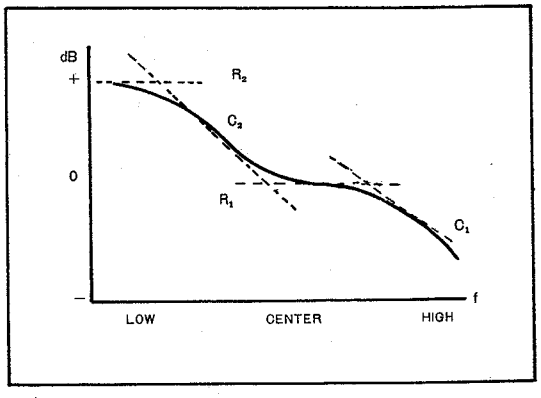




At mid frequencies, the impedance of C2 decreases, the feedback increases (minimum limit depends on R1) and the amplification increases.

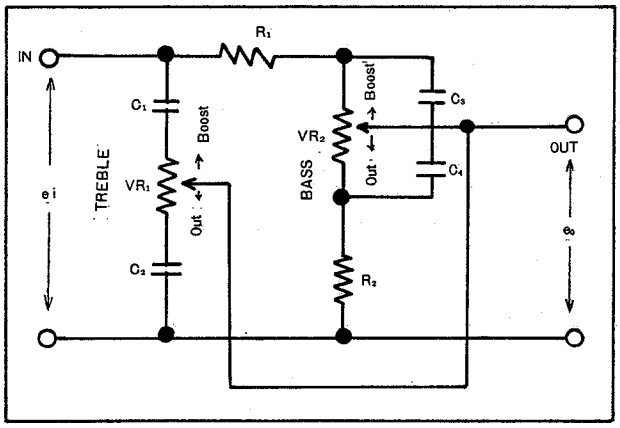
As the frequency increases, the impedance of C2 increases, the feedback decreases, and amplification increases (attenuation decreases).

When the above mentioned effects are combined, the following characteristic curve is obtained.

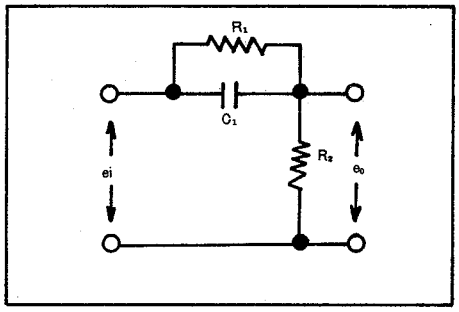


Since this curve has a characteristic exactly opposite to the record play-back characteric, the output of the equalizer amplifier has a flat characteristic.

TONE CONTROLL (CR)

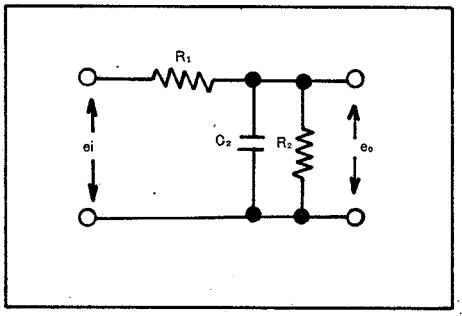


A) Treble boost



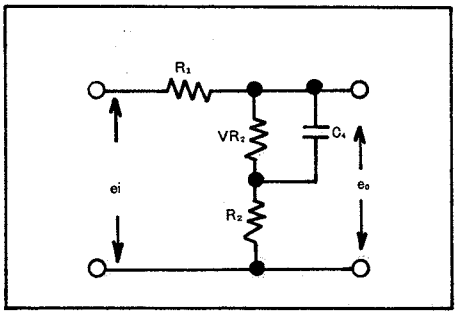
In low and mid frequency range the impedance of C1 is large and the voltage produced across the terminals of R2 is the voltage divided by R1 and R2. As the frequency increases, the impedance of C1 decreases and the voltage produced across R2 increases.

B) High cut



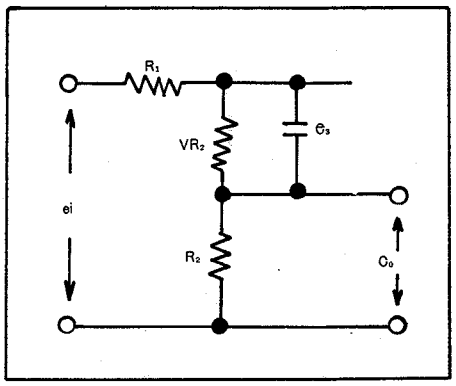
In low and mid frequency range the impedance of C2 is large and the gain is decreased. As the frequency increases, the impedance of C2 decreases and hence the voltage produced also decreases.

C) Low boost



In mid and high frequency range, the impedance of C4 is low and the output voltage is that divided by R1 and R2. But as the frequency decreases, the impedance of C4 increases and hence the output voltage also increases.

D) Low cut



In mid and high frequency range, the impedance of C3 is low and the output voltage is also low. But as the frequency decreases, the impedance of C3 further decreases and hence the output voltage.

SEMICOMPLEMENTARY MAIN AMPLIFIER

In the power amplifier section, in order to produce a large output in the absolutely complementary circuit using PNP and NPN transistors of matched characteristics, an OTL-ITL circuit construction with NPN transistor connected in darlington is used. This is called semicomplementary circuit. In OTL-ITL circuit a large amount of negative feedback can be applied since no transformer is used in coupling to the preceding stage, and hence the amplifier is a low distortion amplifier of good frequency characteristic.

Circuit description (Fig.1)

According to the circuit construction, almost of the gain is obtained from Q106. For this reason the collector resistor of Q106 is split into R137 and R138, and by making the splitting point and the output the same potential by connecting them with capacitor C125 (so called bootstrap circuit) load of Q106 is made light and as high gain as possible is obtained. The gain obtained by this stage is about 50dB.

The input stage employs a PNP silicon transistor.

This is used for making the circuit direct coupled and also from the point of view of DC feedback. To be specific, since the DC potential of the base of Q106 is about 0.6V, the transistor operates normally when the collector of the input stage is directly connected to the base so that a Vce of more than 1V becomes necessary and hence it is necessary to use a PNP transistor to supply the emitter power from + side. Moreover, by taking the emitter power from the midpoint of the output stage, DC and AC negative feedback is easily applied.

The AC feedback is determined by R136 and R135 and the overall gain is determined by the ratio of R136 + R135 and R135.

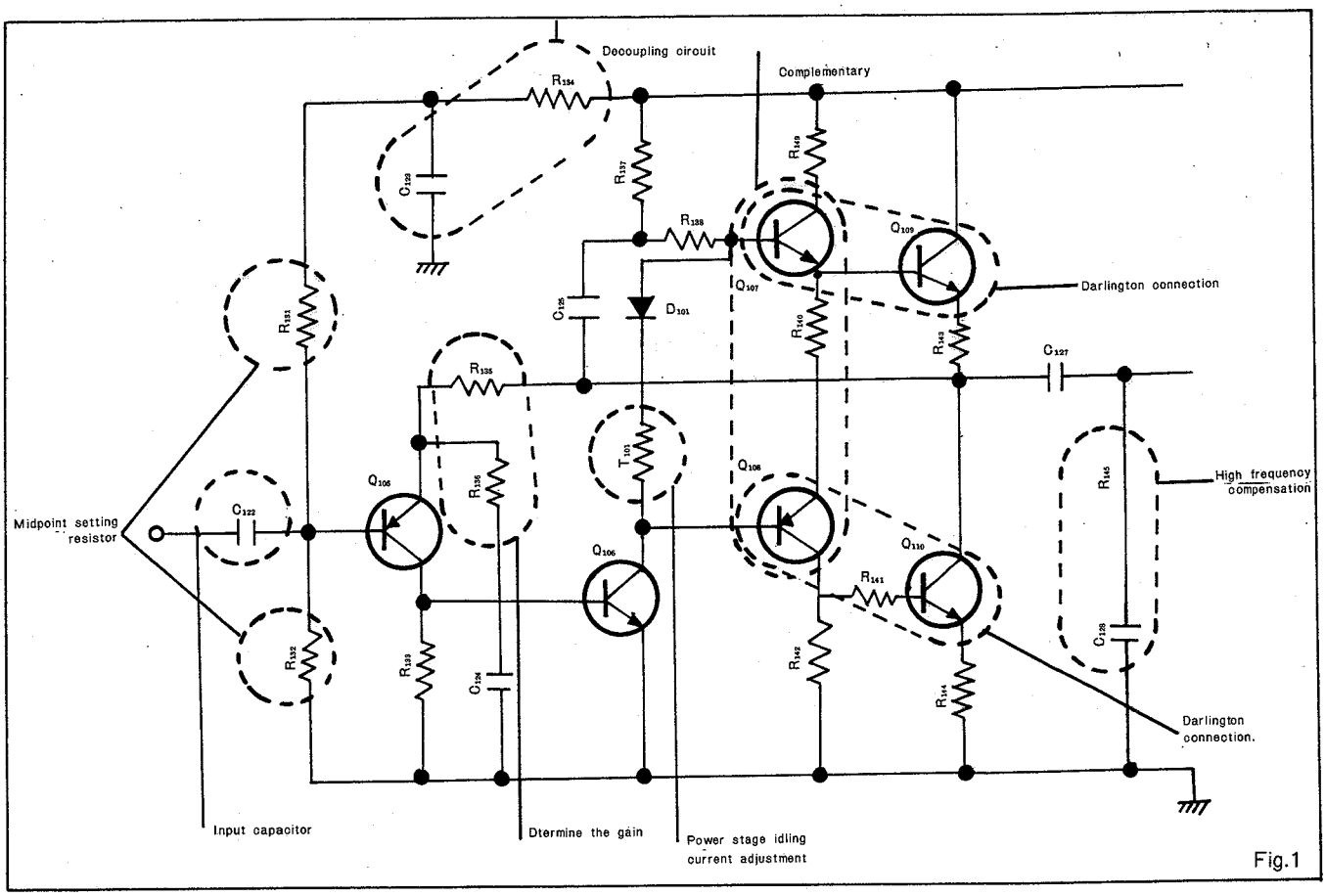
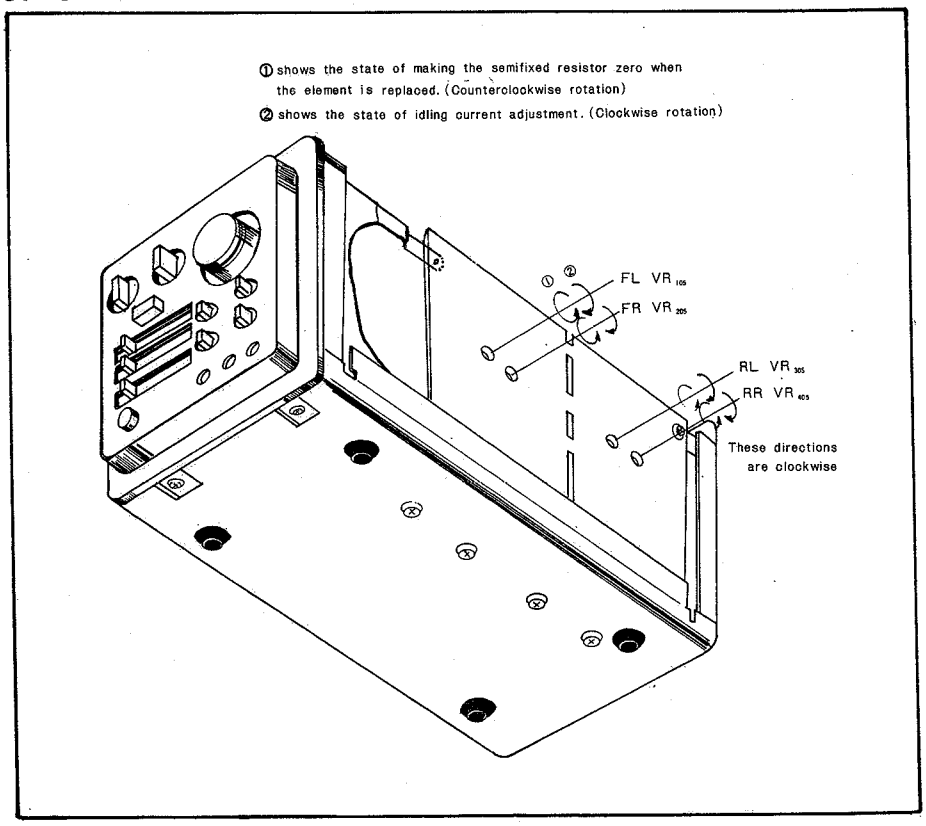


Fig.1

* ADJUSTMENT OF UNITE


① shows the state of making the semifixed resistor zero when the element is replaced. (Counterclockwise rotation)
② shows the state of idling current adjustment. (Clockwise rotation)
FL VR 105
FR VR 205
RL VR 305
RR VR 405
These directions are clockwise

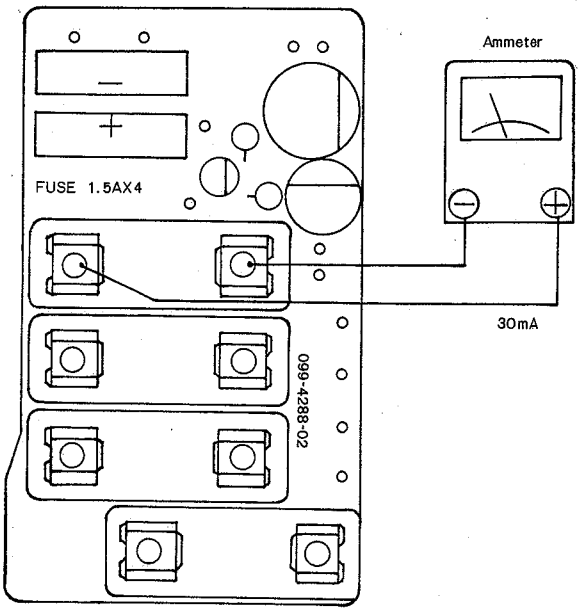
A) Adjustment of idling current of power amplifier

(ollector current at no signal)

1. Turn the power switch OFF, take off the fuse from the power supply PWB, set the semifixed resistors VR105, 205, 305, 405 on the power amp. PWB (above Fig.) to zero (counterclockwise), make sure that the power supply voltage is 220V, and set the master volume control to minimum.

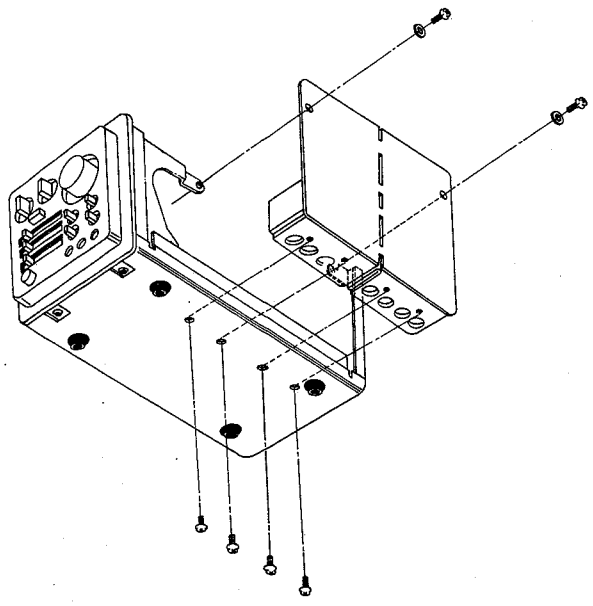
2. Turn the power switch ON, connect an ammeter of 100mA between A — B of FL channel, and adjust by turning the semifixed resistor VR105 of the FL channel clockwise so that the ammeter shows 30mA. After this, perform this adjustment each channel. After completing the adjustment, insert the fuses (1.5A).

NOTE) ○ If the power supply voltage is considerable different from 220V, adjust it to 220V by means of a slidack, etc. before performing the adjustment.
○ Carefully perform this adjustment specially when any part is replaced during repairs.

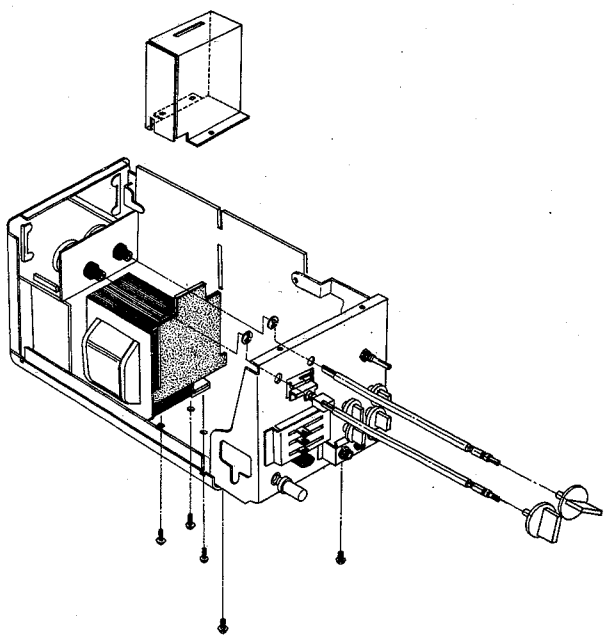


* METHOD OF REMOVING PWB

- **Preamp. PWB**



- **Equalizer PWB**



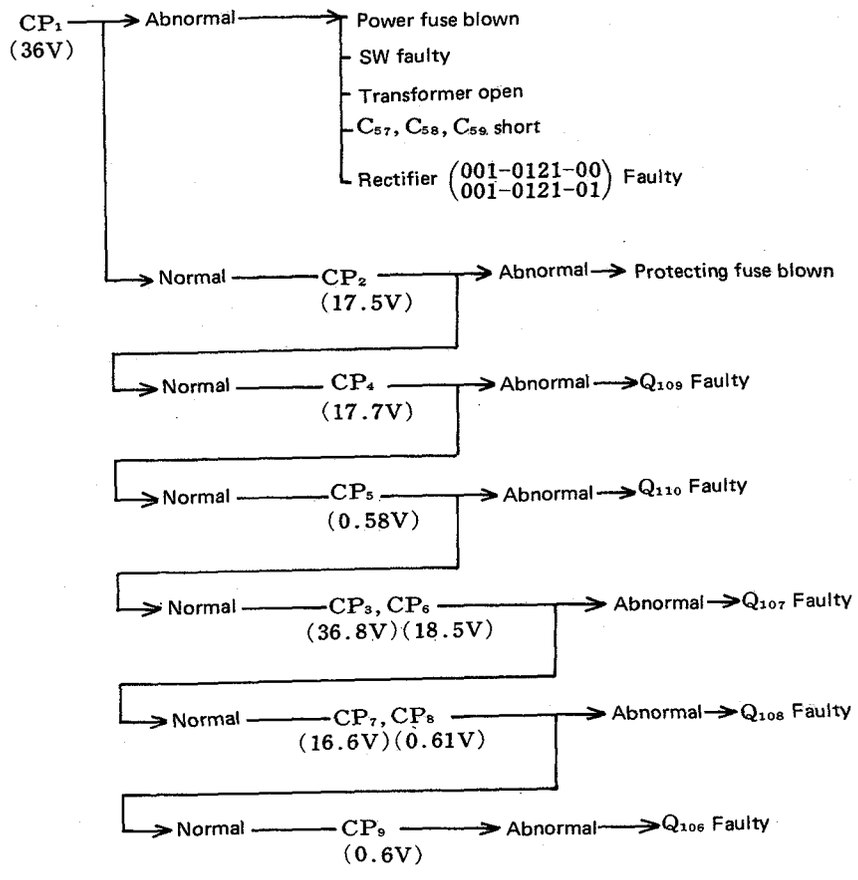
* TROUBLESHOOTING

See the circuit diagram, PWB diagram, and exploded view.

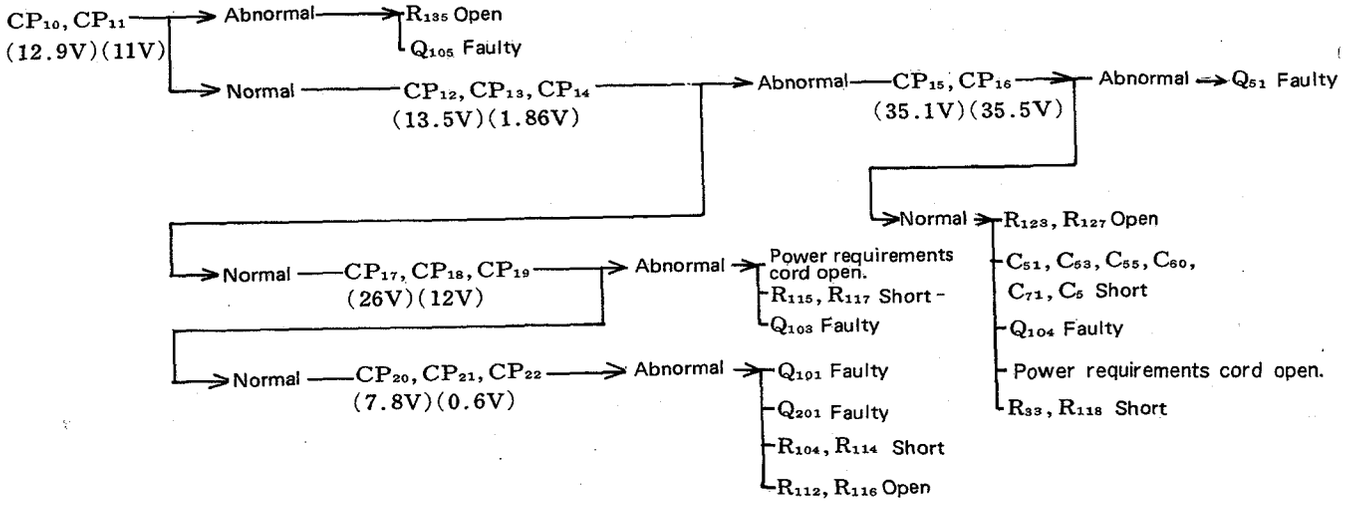
No sound at all

1) Check the power supply circuit

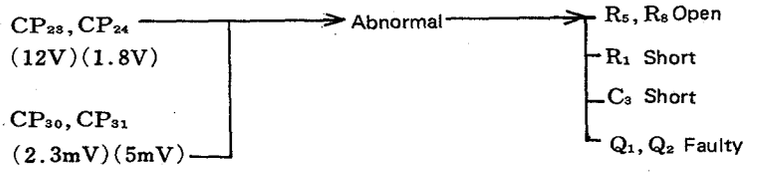
a. Output circuit section



b. Equalizer and tone circuit section

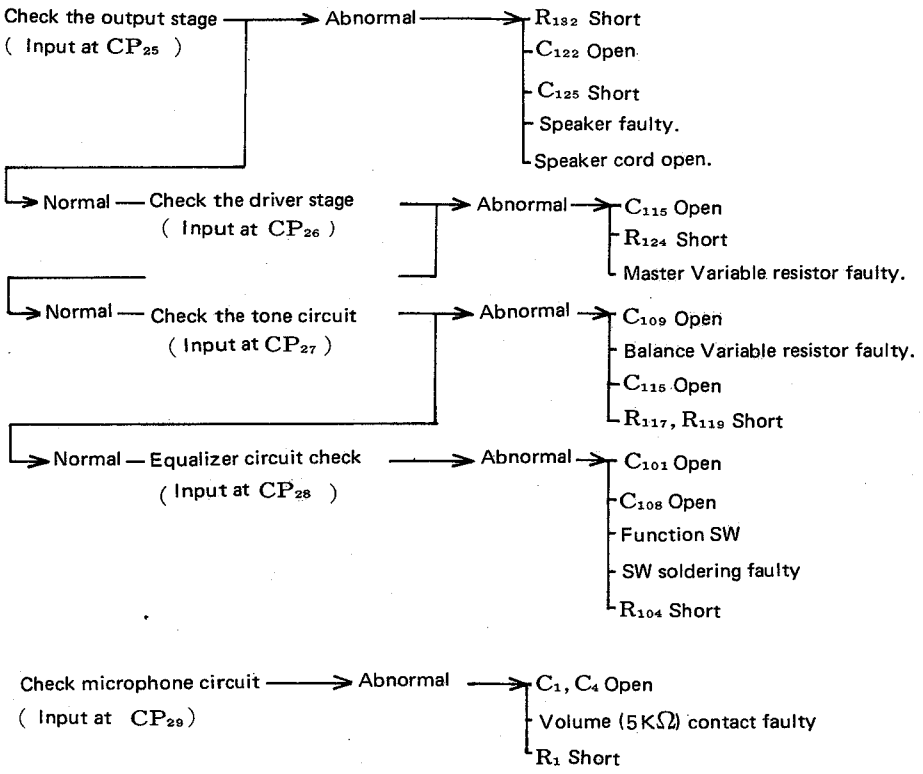


C. Microphone circuit section.



(at set Microphone volume minimum).

2. Check the signal circuit
Feed signal by oscillator.



Volume is low

Driver stage and tone circuit.

- C_{118}, C_{124} Capacity down.
- R_{115}, R_{117}, R_{118}, R_{119}, R_{123}, R_{124}, R_{125}, R_{126}, R_{127}, R_{129}, R_{131}, R_{132}, R_{133}, R_{135} Resistance changed.

Equalizer circuit.

- C_{106}, C_{108} Capacity down
- R_{106}, R_{110}, R_{111}, R_{113} resistance changed. R_{114} short.

Microphone circuit.

- C_3 Capacity down.
- R_5, R_8 Resistance changed

High, low sounds are absent

Equalizer circuit.

- C_{103}, C_{104} Capacity down or short.
- R_{108}, R_{109} Resistance changed or short or open.

Distortion

Driver stage and output circuit.

- D_1~$_3$ Faulty (CP1 . CP2 Check.) (23mA) (1.9mA)
- Q_{109}, Q_{110} characteristic faulty.
- Semifixed resistor faulty or adjust faulty. (500B).
- C_{123}, C_{127} Capacity down.

Equalizer circuit.

- R_{105}, R_{107} Open or resistance changed.
- C_{101}, C_{106}, C_{107}, C_{108} Capacity changed.

Oscillation

Power supply circuit.

- Q_5 Short
- R_{330}, R_{53} Short
- C_{51} Open

Equalizer circuit.

- R_{105} Open
- C_{101}, C_{106}, C_{107}, C_{108} Capacity down.

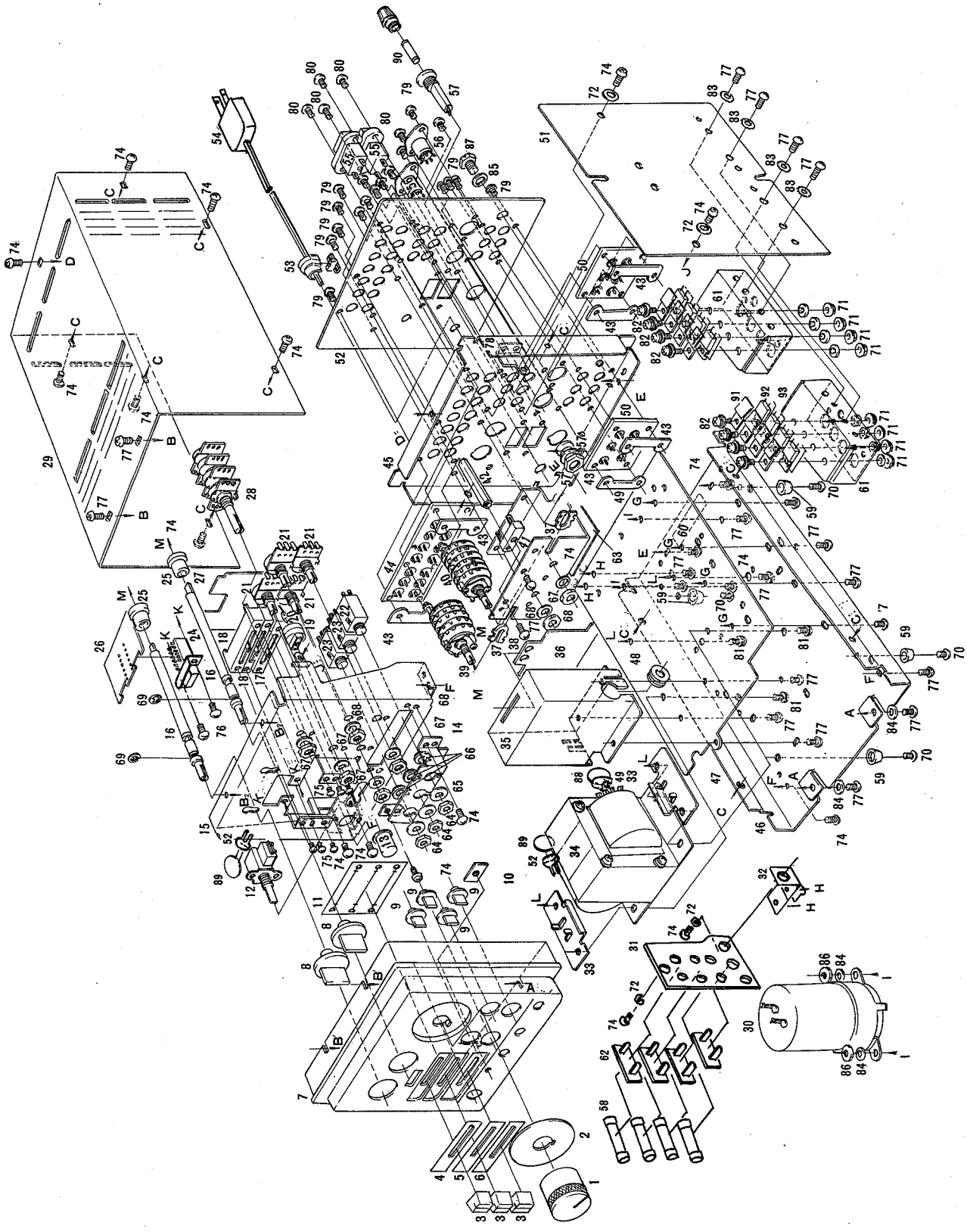
Microphone circuit.

- R_2 Open
- C_1, C_3, C_4 Capacity down.

○ Or soldering fualty, lead open
○ In MA-4000F, the circuit is common except for a part of tone amp. constants. Moreover, the power amp. PWB and pre. amp. PWB are also common in both sets, therefore, there may be difference in the voltages.

* EXPLODED VIEW

⊙Main section

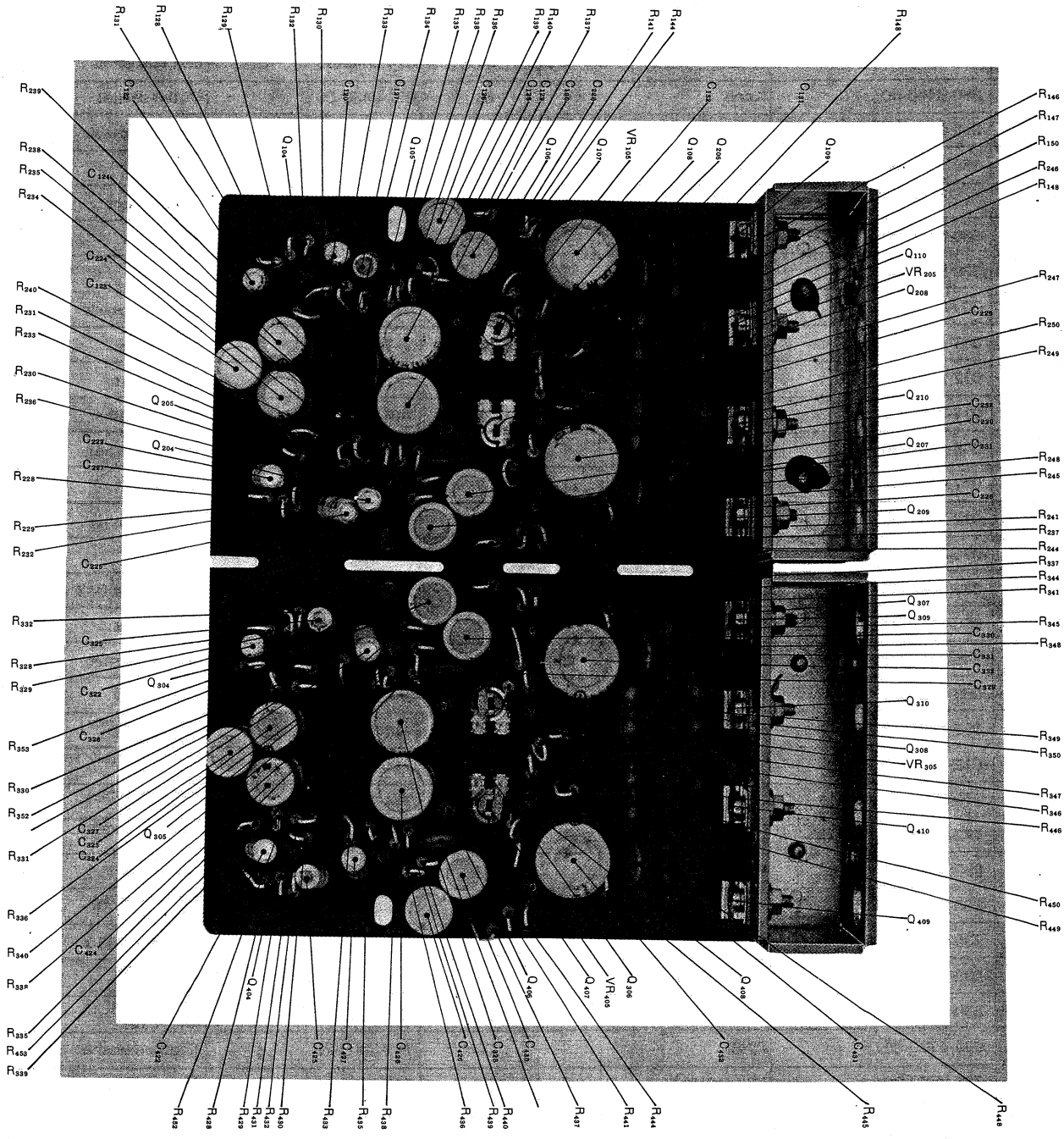


* PARTS LIST ■ Main section

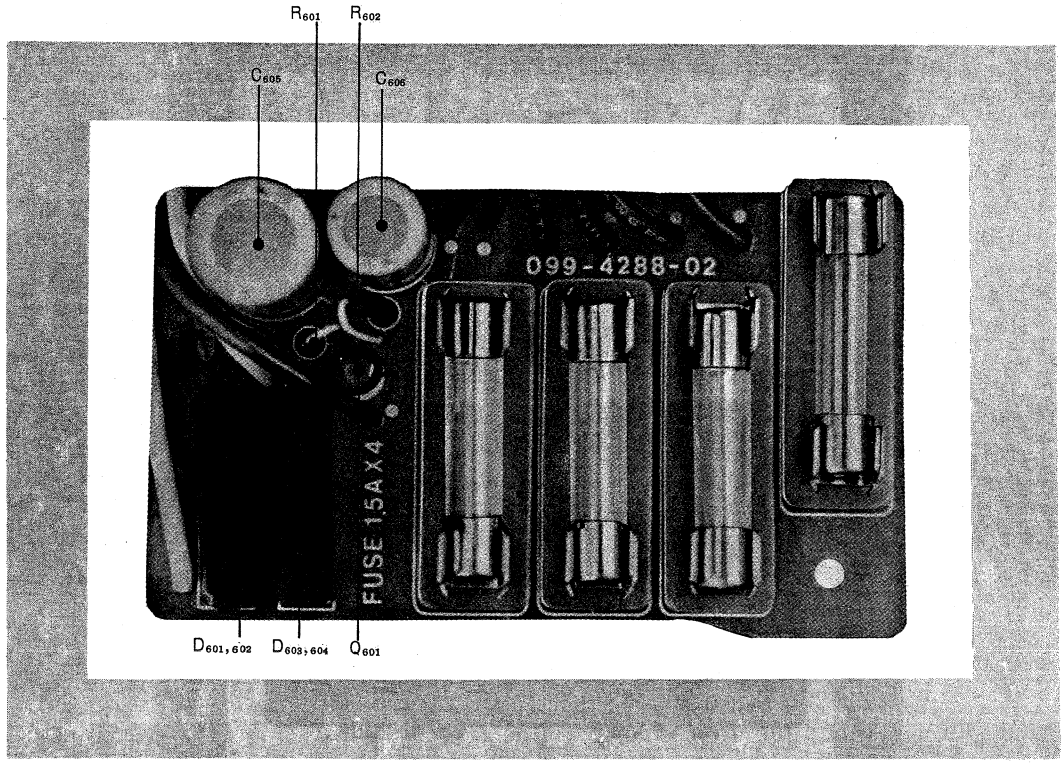
REF.NO.	PART NO.	DESCRIPTION	P.C.S
1	380-3436-00	Knob	1
2	371-2455-00	Trim plate	1
3	380-3433-00	Knob	3
4	371-2456-00	Trim plate	1
5	371-2456-01	Trim plate	1
6	371-2456-03	Trim plate	1
7	370-2906-00	Escutcheon	1
8	380-3441-00	Knob	2
9	380-3440-00	Knob	4
10	375-0516-01	PL-accessory	1
11	353-0046-00	Shade	1
12	013-3156-00	Switch	1
13	380-3435-00	Knob	1
14	330-5328-00	Pressed part	1
15	309-0254-00	Front plate	1
16	341-1016-00	Machined part	2
17	012-3400-00	Variable resistor	1
18	012-3287-03	Variable resistor	2
19	345-2499-00	Rubber part	1
20	017-0320-01	Pilotlamp	1
21	012-3401-00	Variable resistor	4
22	075-0090-00	Jack	1
23	075-0080-00	Jack	2
24	013-3160-01	Switch	1
25	345-2540-00	Rubber part	2
26	099-4289-01	PWB	1
27	099-4287-01	PWB	1
28	012-3402-00	Variable resistor	1
29	310-0798-00	Upper case	1
30	042-0183-00	Special capacitor (50V 4700μF)	1
31	099-4288-02	PWB	1
32	330-5550-00	Pressed part	1
33	330-5321-00	Pressed part	2
34	008-0647-00	Power trans	1
35	330-5414-00	Pressed part	1
36	099-4280-01	PWB	1
37	335-0580-00	Molded part	2
38	330-5418-01	Pressed part	1
39	013-3163-01	Switch	1
40	013-3161-01	Switch	1
41	073-0400-01	Terminal	1
42	341-1017-00	Machined part	1
43	330-5305-00	Pressed part	6
44	075-0100-01	Jack	1
45	307-0235-05	Rear cover	1
46	311-0849-01	Lower case	1
47	330-5336-00	Pressed part	1

REF.NO.	PART NO.	DESCRIPTION	P.C.S
48	345-2422-00	Rubber part	1
49	825-0193-00	Special tube	1
50	075-0099-00	Jack	2
51	099-4281-01	PWB	1
52		Special tube	2
53	335-0725-00	Molded part	1
54	850-1855-01	A-lead	1
55	074-0049-00	Outlet socket	2
56	074-0480-00	Outlet socket	2
57	077-0069-00	Fuse receptacle	1
58	120-0015-00	Fuse (1.5A)	4
59	345-2380-01	Rubber part	4
60	347-0337-00	Paper part	1
61	313-0878-00	Heat sink	2
62	077-0067-00	Fuse receptacle	4
63	347-0466-00	Paper part	1
64	722-0231-00	Special nut	3
65	746-0643-00	Special washer	3
66	746-0641-00	Special washer	3
67	722-0282-00	Special nut	7
68	745-0485-00	Special washer	7
69	743-4000-00	E-ring (4)	2
70	737-3008-11	Sems screw (M3 x 8)	4
71	722-0320-00	Special nut	8
72	746-0030-00	Special washer	4
73	286-3885-01	Setplate	1
74	714-3006-11	Machine screw (M3 x 6)	20
75	714-2004-11	Machine screw (M2 x 4)	6
76	714-2604-11	Machine screw (M2.6 x 4)	2
77	714-3008-11	Machine screw (M3 x 8)	20
78	330-5549-00	Pressed part	1
79	714-3008-19	Machine screw (M3 x 8)	16
80	731-3008-19	Taptight (M3 x 8)	8
81	732-4010-11	Sems screw (M4 x 10)	4
82	732-3012-11	Sems screw (M3 x 12)	8
83	742-3000-20	Toothed washer	4
84	740-3000-11	Flat washer (M3)	4
85	740-4000-12	Flat washer (M4)	1
86	723-3000-21	Hexagon nut (M3)	2
87	710-4010-22	Hexagon bolt (M4 x 10)	1
88	043-0023-00	Special capacitor (500V 0.02μF)	1
89	043-0065-00	Special capacitor	2
90	120-0010-00	Fuse (1A)	1
91	079-0002-00	TR-holder	8
92	2SC734 and 2SA561	Transistor	8
93	078-0015-00	Insulater sheet	8

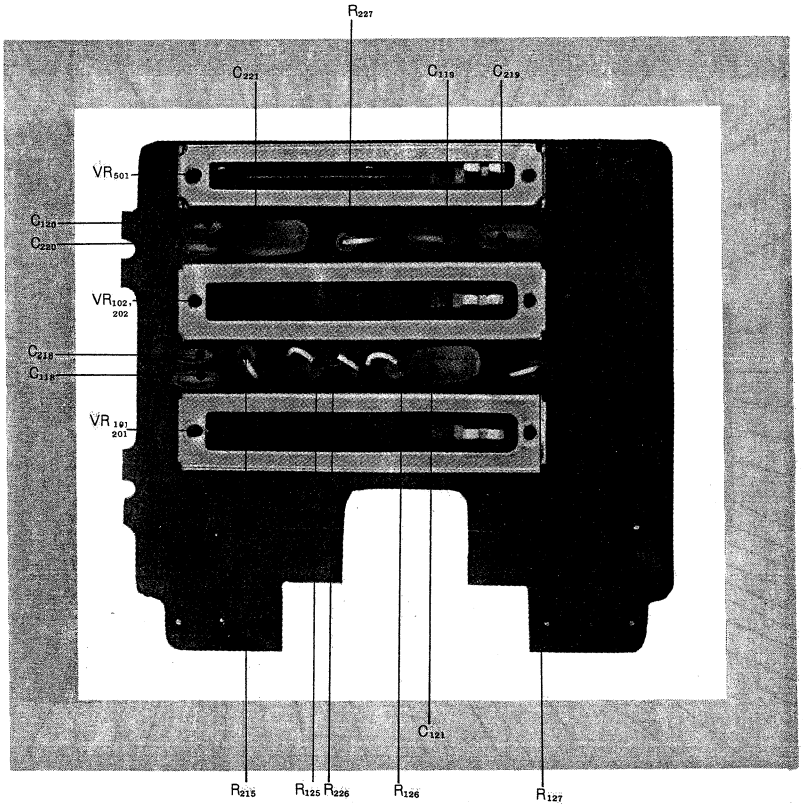
*MAIN AMP SECTION



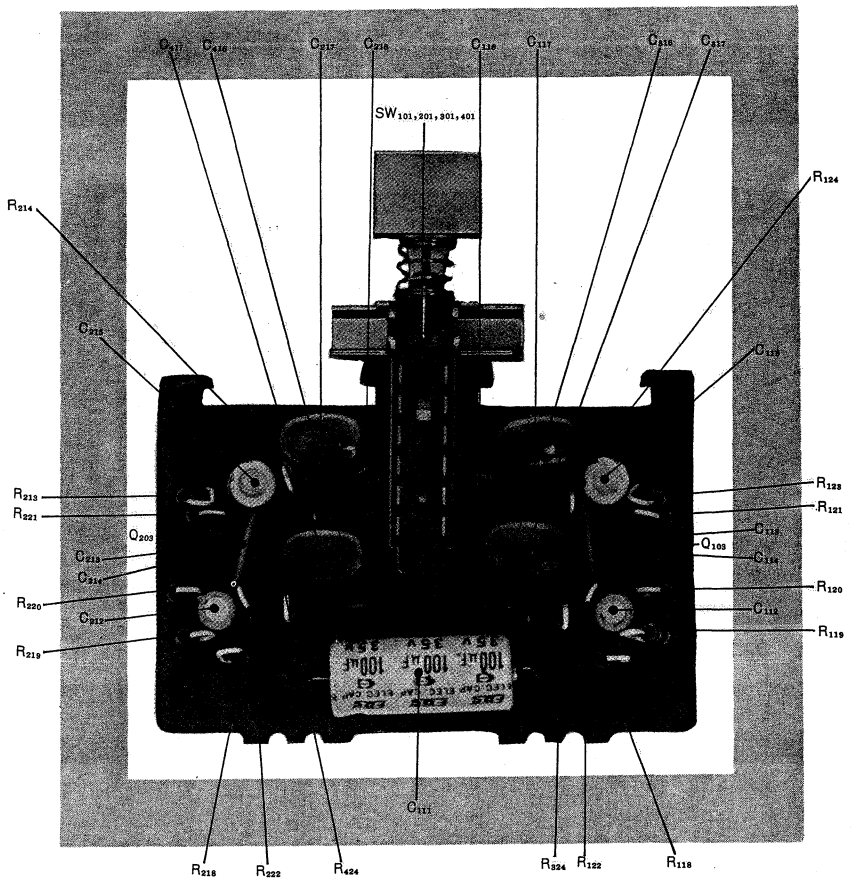
*POWER REGUIREMENTS SECTION



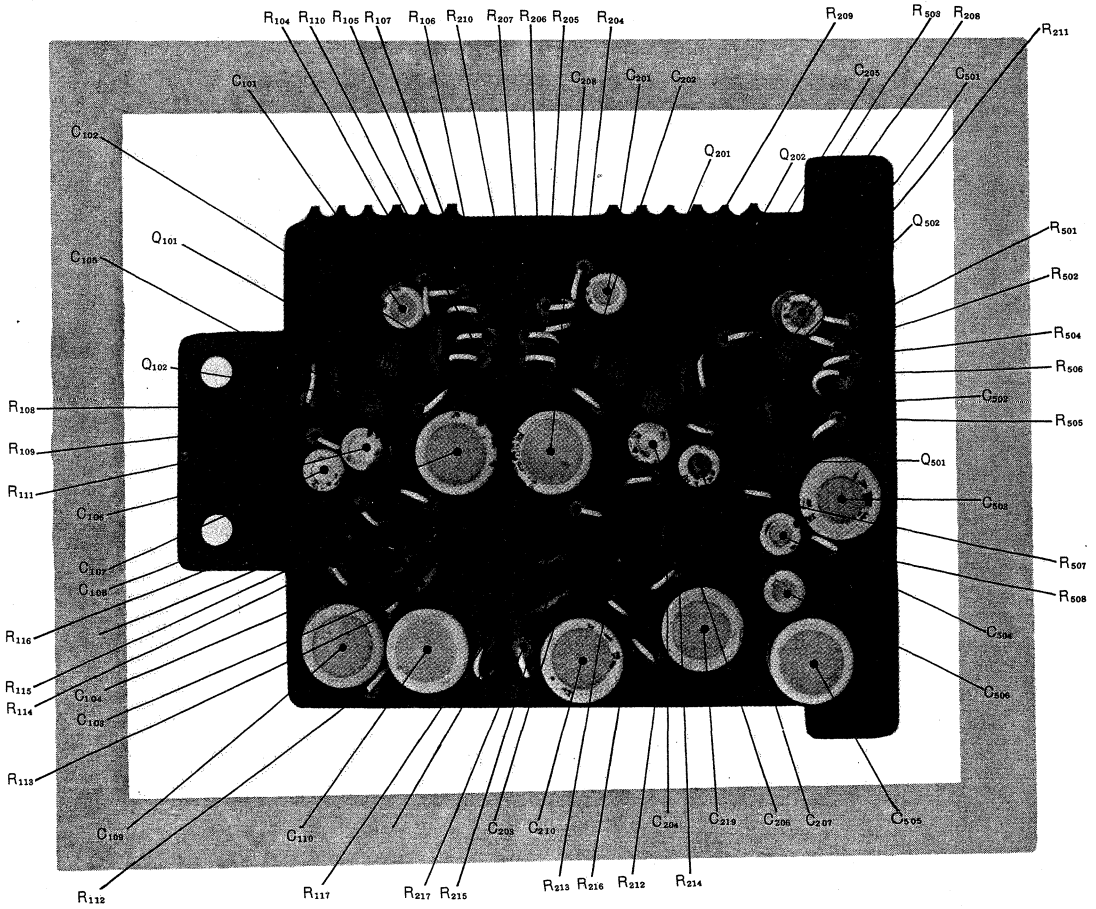
*TONE CONTROL SECTION



*LOUDNES SW SECTION



*PRE AMP SECTION

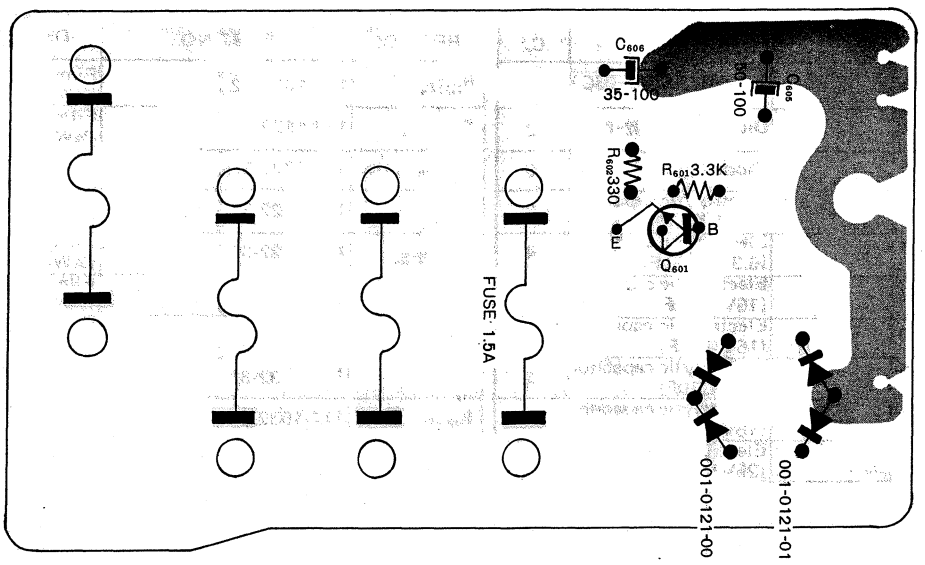


■ Electrical section

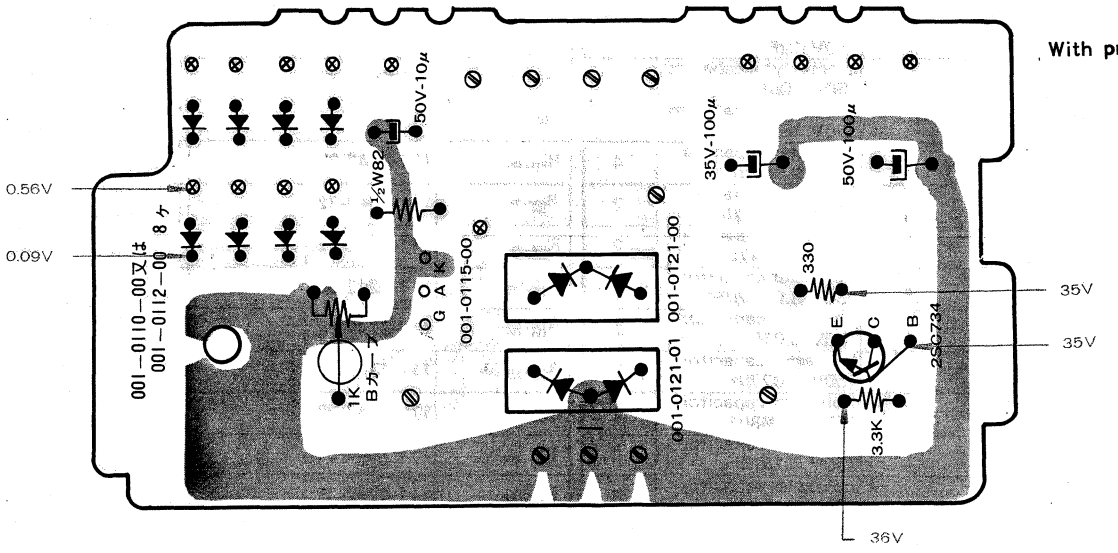
REF.NO.	PART NO.	DESCRIPTION	P.C.S
$D_{601,602}$	001-0121-00	Diode(ESAC02-03C)	2
$D_{603,604}$	001-0121-01	Diode(ESAC02-03N)	2
$D_{101,201,301,401,605,612}$	001-0112-00	Diode (1S1588)	6
$C_{108,208,153}$	180-1074-12	Electrolytic capacitor (6.3V 100μF)	3
$C_{124,224,324,424}$	180-2274-12	Electrolytic capacitor (6.3V 220μF)	4
$C_{122,222,322,422,101,201,501}$	180-4754-32	Electrolytic capacitor (16V 4.7μF)	7
$C_{106,107,206,207,125,225,325,425,504}$	180-1064-32	Electrolytic capacitor (16V 10μF)	9
$C_{115,215}$	180-3364-32	Electrolytic capacitor (16V 33μF)	2
$C_{128,228,328,428}$	180-4774-32	Electrolytic capacitor (16V 470μF)	4
$C_{130,230,330,430}$	180-4764-42	Electrolytic capacitor (25V 47μF)	4
$C_{109,110,209,210}$	180-1074-42	Electrolytic capacitor (25V 100μF)	4
$C_{132,232,332,432}$	180-1084-42	Electrolytic capacitor (25V 1000μF)	4
$C_{111,123,323}$	180-1074-52	Electrolytic capacitor (35V 100μF)	3
C_{606}	180-1074-51	Electrolytic capacitor (35V 100μF)	1
$C_{127,227,327,427}$	180-1054-62	Electrolytic capacitor (50V 1μF)	4
C_{607}	180-1064-62	Electrolytic capacitor (50V 10μF)	1
C_{605}	180-1074-62	Electrolytic capacitor (50V 100μF)	1
$C_{116,216,316,416}$	141-1022-11	Polyester capacitor (50V 0.001μF)	4
$C_{118,218}$	141-3322-12	Polyester capacitor (50V 0.0033μF)	2
$C_{104,204}$	141-4722-12	Polyester capacitor (50V 0.0047μF)	2
$C_{120,220}$	141-8222-12	Polyester capacitor (50V 0.0082μF)	2
$C_{103,203}$	141-1532-13	Polyester capacitor (50V 0.015μF)	2
$C_{119,219}$	141-2732-14	Polyester capacitor (50V 0.027μF)	2
$C_{121,221}$	141-6832-15	Polyester capacitor (50V 0.068μF)	2
$C_{131,231,331,431}$	141-1042-15	Polyester capacitor (50V 0.1μF)	4
$C_{117,217,317,417}$	141-1542-16	Polyester capacitor (50V 0.15μF)	4
C_{502}	144-1002-11	Mica capacitor (50V 10PF)	1
$C_{114,214}$	144-4702-12	Mica capacitor (50V 47PF)	2
$C_{113,213}$	144-1812-17	Mica capacitor (50V 180PF)	2
$C_{102,202}$	144-5602-12	Mica capacitor (50V 56PF)	2
$C_{129,229,329,429}$	144-3912-17	Mica capacitor (50V 390PF)	4
$R_{105,205,305,405}$	012-3250-00	Variable resistor	4
$R_{148,149,248,249,348,349,448,449}$	114-4782-51	Film resistor (1W 0.47Ω ± 10%)	8
$R_{150,250,350,450}$	114-1002-51	Film resistor (1W 10Ω ± 10%)	4
$R_{151,251,351,451}$	110-1512-41	Solid resistor (½W 150Ω ± 10%)	4
$R_{139,239,339,439}$	111-3302-32	Film resistor (¼W 33Ω ± 10%)	4
$R_{144,244,344,444}$	111-6802-32	Film resistor (¼W 68Ω ± 10%)	4
$R_{130,230,330,430}$	111-8202-32	Film resistor (¼W 82Ω ± 10%)	4
$R_{143,243,343,443}$	111-1512-32	Film resistor (¼W 150Ω ± 10%)	4
R_{506}	111-1812-32	Film resistor (¼W 180Ω ± 10%)	1
$R_{118,218,107,207}$	111-2212-32	Film resistor (¼W 220Ω ± 10%)	4
$R_{109,209}$	111-2712-32	Film resistor (¼W 270Ω ± 10%)	2
$R_{146,246,346,446,145,345}$	111-3312-32	Film resistor (¼W 330Ω ± 10%)	6
$R_{110,210,131,410,231,431,310,331}$	111-3912-32	Film resistor (¼W 390Ω ± 10%)	8
$R_{138,238,338,438}$	111-4712-32	Film resistor (¼W 470Ω ± 10%)	4

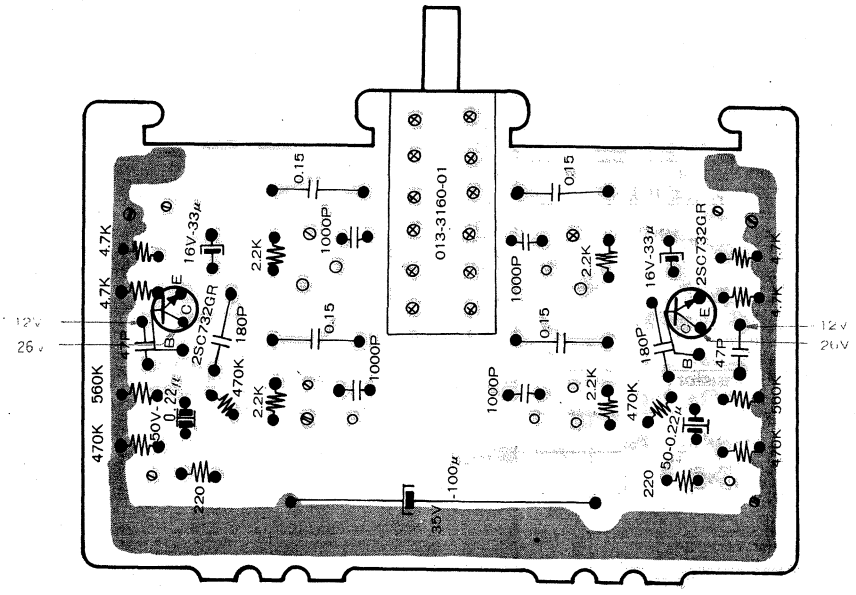
REF.NO.	PART NO.	DESCRIPTION	P.C.S
$R_{141,241,341,441,504}$	111-1022-32	Film resistor (¼W 1KΩ ± 10%)	5
$R_{117,217,142,242,342,442}$	111-1522-32	Film resistor (¼W 15KΩ ± 10%)	6
$R_{124,224}$	111-2222-32	Film resistor (¼W 2.2KΩ ± 10%)	2
$R_{132,232,332,432}$	111-3322-32	Film resistor (¼W 3.3KΩ ± 10%)	4
$R_{121,221,321,213,104,204}$	111-4722-32	Film resistor (¼W 4.7KΩ ± 10%)	6
$R_{133,233,333,433}$	111-5622-32	Film resistor (¼W 5.6KΩ ± 10%)	4
$R_{111,211}$	111-8222-32	Film resistor (¼W 8.2KΩ ± 10%)	2
R_{501}	111-1032-32	Film resistor (¼W 10KΩ ± 10%)	1
$R_{125,215}$	111-1532-32	Film resistor (¼W 15KΩ ± 10%)	2
$R_{116,216}$	111-1832-32	Film resistor (¼W 18KΩ ± 10%)	2
$R_{113,213}$	111-2232-32	Film resistor (¼W 22KΩ ± 10%)	2
$R_{353,453}$	111-2732-32	Film resistor (¼W 27KΩ ± 10%)	2
$R_{126,226,326,426}$	111-3332-32	Film resistor (¼W 33KΩ ± 10%)	4
$R_{137,237,337,437}$	111-4732-32	Film resistor (¼W 47KΩ ± 10%)	4
$R_{134,234}$	111-5632-32	Film resistor (¼W 56KΩ ± 10%)	2
$R_{135,235,335,435}$	111-6832-32	Film resistor (¼W 68KΩ ± 10%)	4
$R_{136,236,336,436,106,205}$	111-1042-32	Film resistor (¼W 100KΩ ± 10%)	6
$R_{352,452}$	111-1242-32	Film resistor (¼W 120KΩ ± 10%)	2
$R_{502,206}$	111-1542-32	Film resistor (¼W 150KΩ ± 10%)	3
$R_{115,215}$	111-1842-32	Film resistor (¼W 180KΩ ± 10%)	2
$R_{108,208,503}$	111-2242-32	Film resistor (¼W 220KΩ ± 10%)	3
$R_{129,229,329,429}$	111-2742-32	Film resistor (¼W 270KΩ ± 10%)	4
$R_{119,219,122,222,508}$	111-4742-32	Film resistor (¼W 470KΩ ± 10%)	5
$R_{120,220}$	111-5642-32	Film resistor (¼W 560KΩ ± 10%)	2
$R_{102,202}$	111-1042-31	Film resistor (¼W 100KΩ ± 10%)	2
$R_{101,201}$	111-4742-31	Film resistor (¼W 470KΩ ± 10%)	2

* PRINTED WIRING BOARD

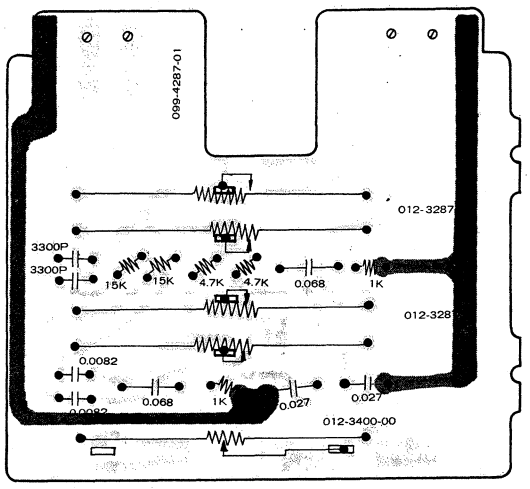


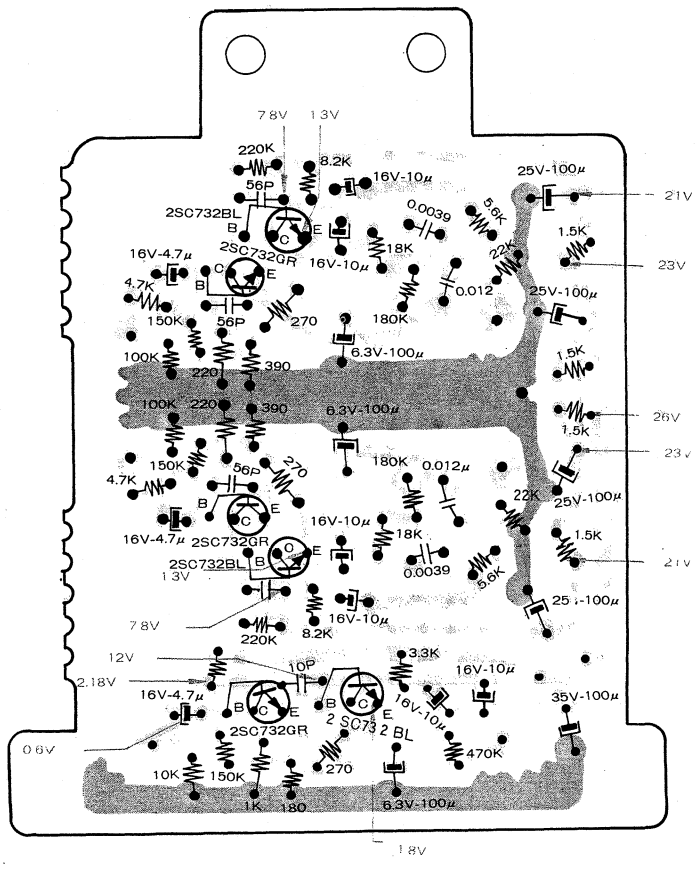
With protector switch



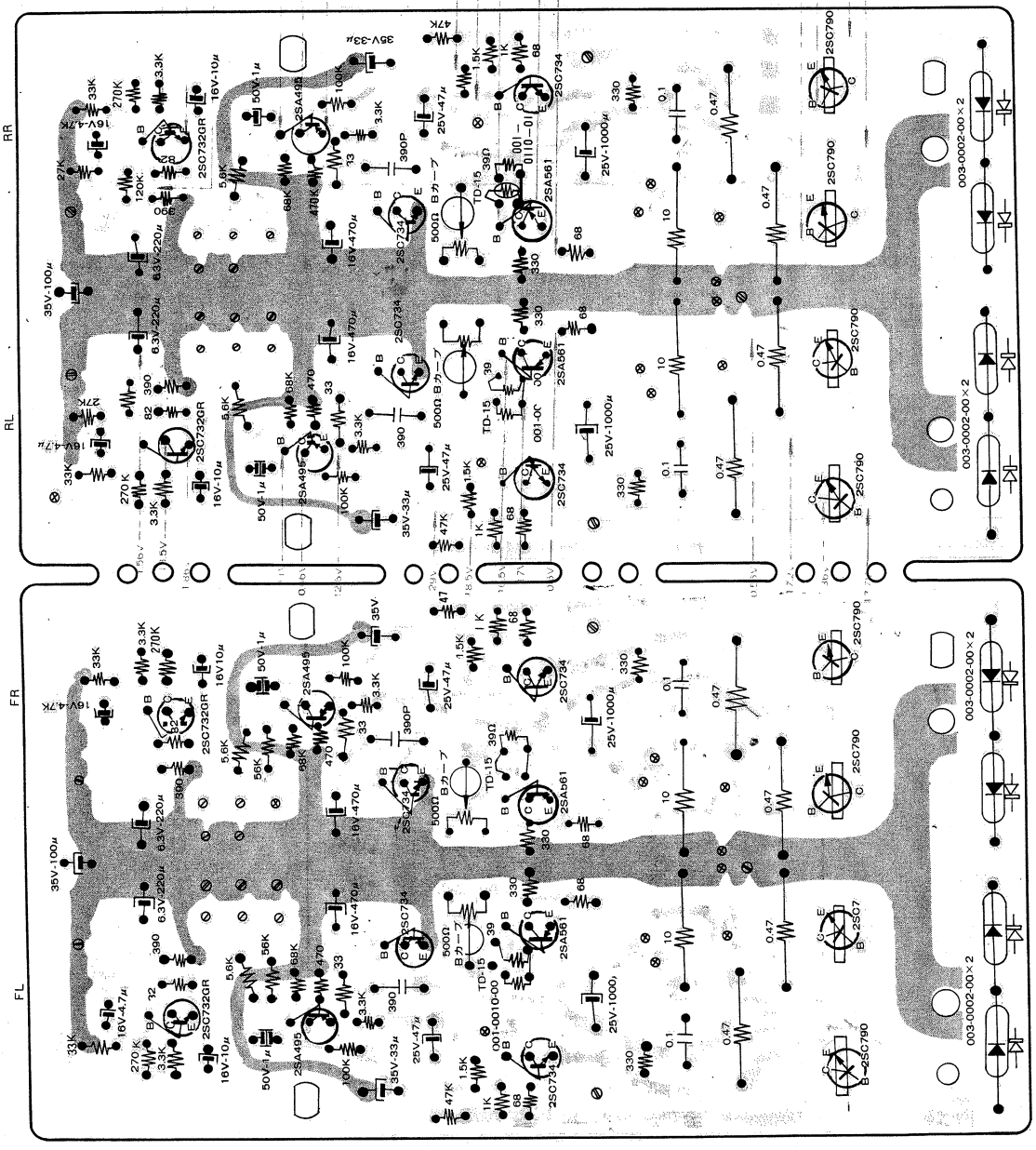


Voltage measured with respect to ground.



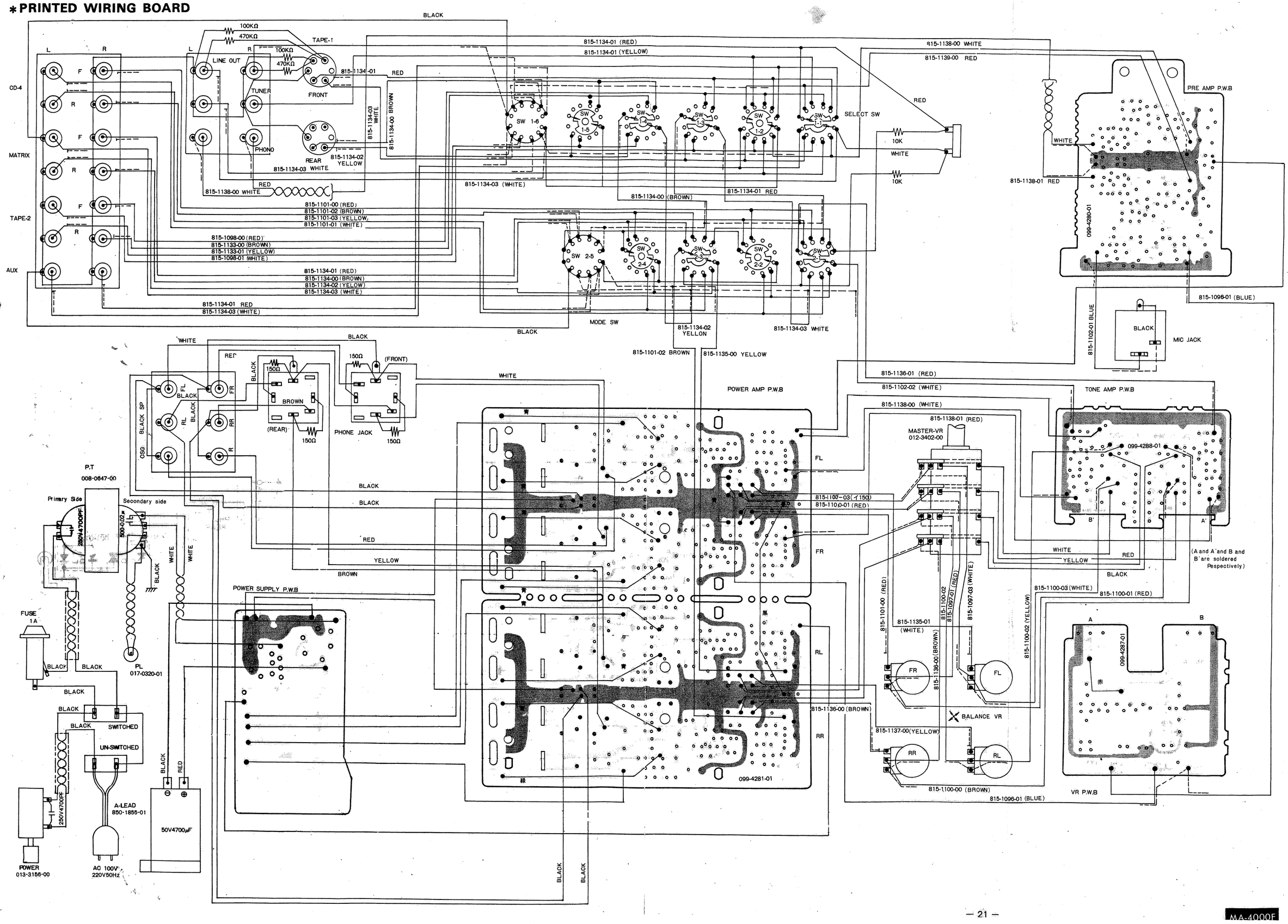


Voltage measured with respect to ground.

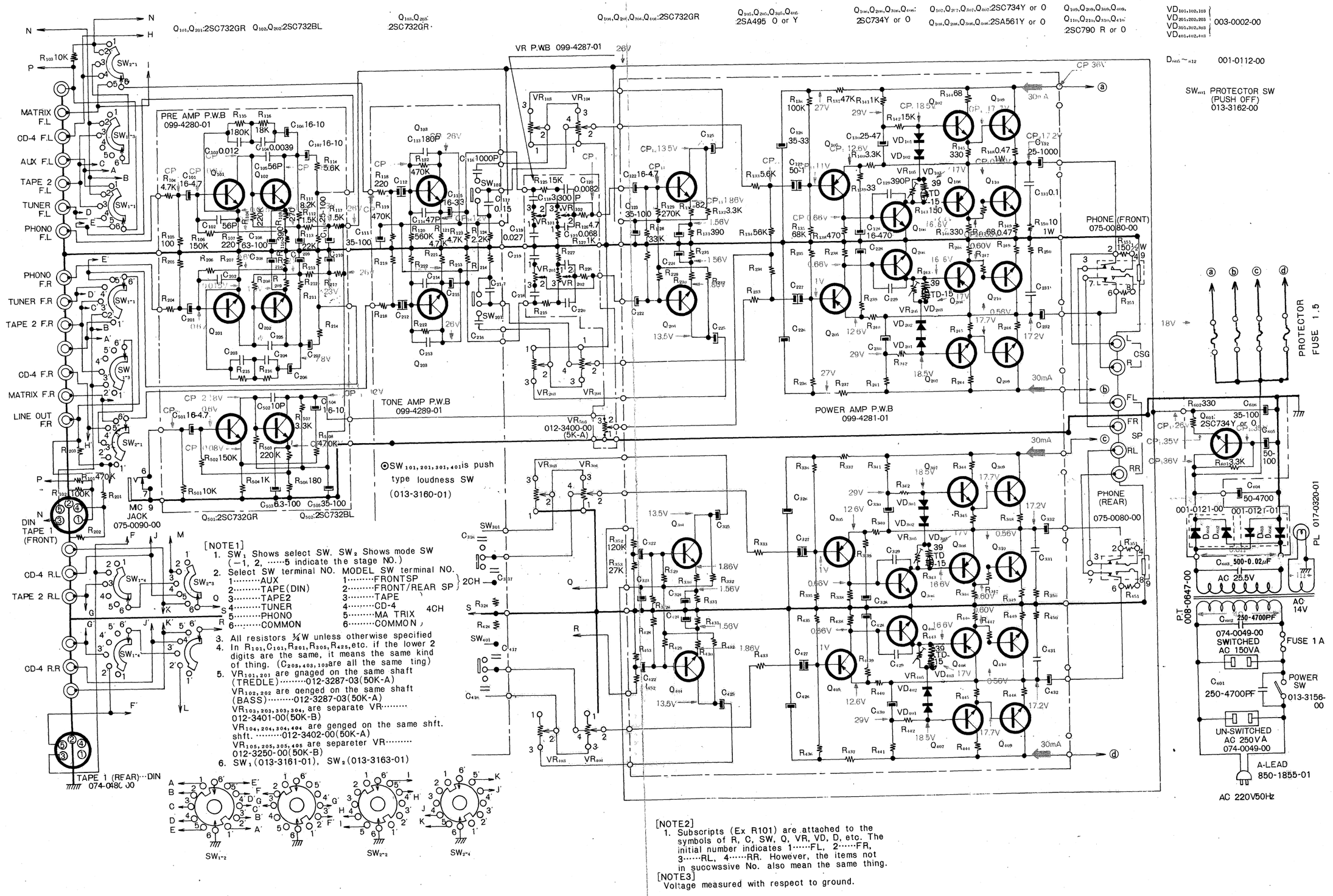


Voltage measured with respect to ground.

*PRINTED WIRING BOARD



*CIRCUIT DIAGRAM:



[NOTE1]
1. SW_1 Shows select SW. SW_2 Shows mode SW (−1, 2, ·····5 indicate the stage NO.)
2. Select SW terminal NO. MODEL SW terminal NO.

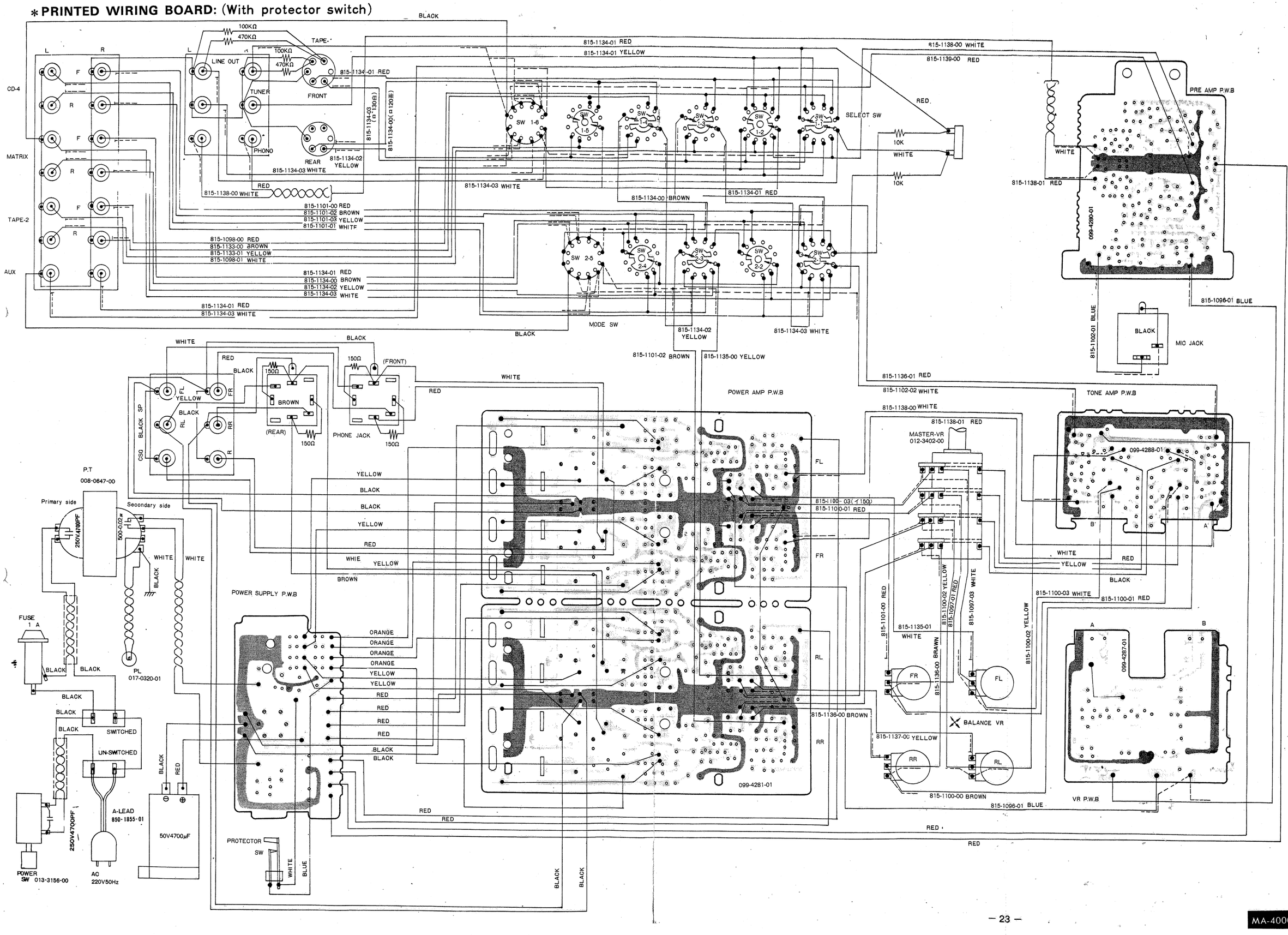
1·····AUX	1·····FRONTSP	
2·····TAPE(DIN)	2·····FRONT/REAR SP	2CH
3·····TAPE2	3·····TAPE	
4·····TUNER	4·····CD-4	4CH
5·····PHONO	5·····MA TRIX	
6·····COMMON	6·····COMMON	

3. All resistors ¼W unless otherwise specified
4. In R_{101},C_{101},R_{201},R_{305},R_{425},etc. if the lower 2 digits are the same, it means the same kind of thing. ($C_{203,403,103}$ are all the same ting)
5. $VR_{101,201}$ are gnaged on the same shaft (TREDLE)·····012-3287-03(50K-A)
   $VR_{102,202}$ are genged on the same shaft (BASS)·····012-3287-03(50K-A)
   $VR_{103,203,303,304}$ are separate VR····· 012-3401-00(50K-B)
   $VR_{104,204,304,404}$ are genged on the same shft. shft. ·····012-3402-00(50K-A)
   $VR_{105,205,305,405}$ are separeter VR····· 012-3250-00(50K-B)
6. SW_1(013-3161-01), SW_2(013-3163-01)

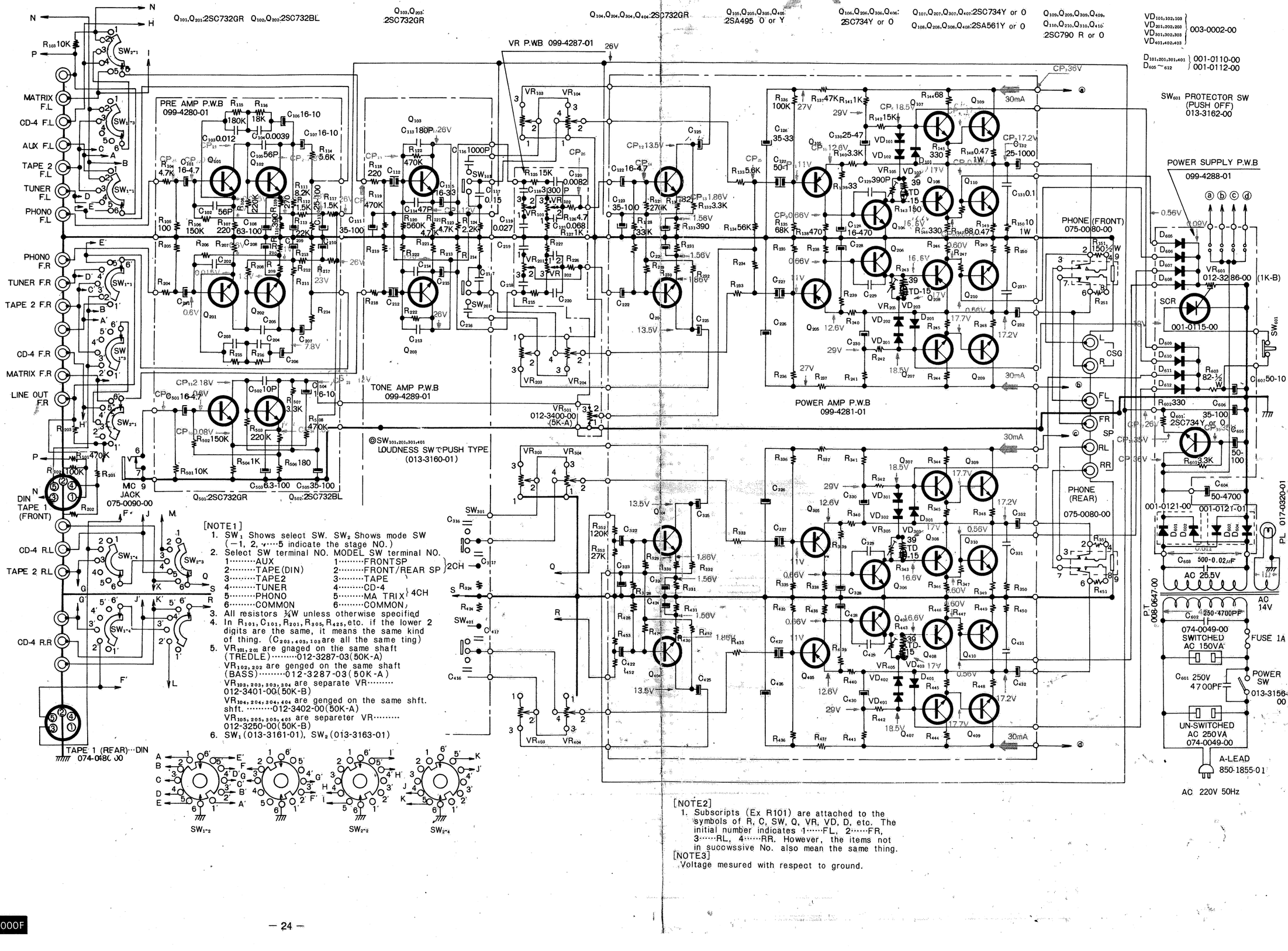
[NOTE2]
1. Subscripts (Ex R101) are attached to the symbols of R, C, SW, Q, VR, VD, D, etc. The initial number indicates 1·····FL, 2·····FR, 3·····RL, 4·····RR. However, the items not in succwssive No. also mean the same thing.

[NOTE3]
Voltage measured with respect to ground.

＊PRINTED WIRING BOARD: (With protector switch)



✱CIRCUIT DIAGRAM: (With protector switch)



[NOTE1]

1. SW_1 Shows select SW. SW_2 Shows mode SW (—1, 2, ·····5 indicate the stage NO.)
2. Select SW terminal NO. MODEL SW terminal NO.

1·····AUX	1·····FRONTSP } 2CH
2·····TAPE(DIN)	2·····FRONT/REAR SP }
3·····TAPE2	3·····TAPE
4·····TUNER	4·····CD-4 } 4CH
5·····PHONO	5·····MA TRIX }
6·····COMMON	6·····COMMON

3. All resistors ¼W unless otherwise specified
4. In R_{101}, C_{101}, R_{201}, R_{305}, R_{425}, etc. if the lower 2 digits are the same, it means the same kind of thing. ($C_{203,403,103}$ are all the same ting)
5. $VR_{101,201}$ are gnaged on the same shaft (TREDLE)·····012-3287-03(50K-A)
   $VR_{102,202}$ are genged on the same shaft (BASS)·····012-3287-03(50K-A)
   $VR_{103,203,303,304}$ are separate VR····· 012-3401-00(50K-B)
   $VR_{104,204,304,404}$ are genged on the same shft. shft. ·····012-3402-00(50K-A)
   $VR_{105,205,305,405}$ are separeter VR····· 012-3250-00(50K-B)
6. SW_1(013-3161-01), SW_2(013-3163-01)

[NOTE2]

1. Subscripts (Ex R101) are attached to the symbols of R, C, SW, Q, VR, VD, D, etc. The initial number indicates 1·····FL, 2·····FR, 3·····RL, 4·····RR. However, the items not in succwssive No. also mean the same thing.

[NOTE3]

Voltage mesured with respect to ground.